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EXAMINER

PADGETT, MARIANNE L

ART UNIT PAPER NUMBER

1762

DATE MAILED: 11/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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1. Applicants amendments to the specification have removed the objection thereto, and significantly improved its readability. It is further noted that in paragraph [0019], that the change from "air bleed" to "gas bleeding", while literally appearing to have different scopes when read in context with the preceding processing steps would appear to be consistent therewith, as from the context it appears that "air" was used to generically referred to whatever gas atmosphere was present as opposed to atmospheric air, especially considering that the chamber had just been flushed with argon to remove any oxygen from the preceding oxygen plasma step.

2. Applicants' Amendments to the claims have removed the problems noted in the 112, second paragraph rejection of section 2 of the 4/12/2005 rejection.

The amendment of independent claims 1 and 10 to require the adhesion layer to be nickel or phosphorus nickel has removed the rejection over Miller (4,544,571), in view of Gabower (6,570,085 B1), optionally considering Motoki et al (5,462,771) from section 5 of the 4/12/2005 rejection.

3. Claims 5 and 9 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Due to the amendment in step (b) of claim 1, claim 5 does not appear to further limit the independent claim. Similarly, claim 9 now duplicates the limitations of claim 6, so does not further limit that preceding claim, as both required to shielding layer to be ion plated copper, both plated on to the same composition of adhesion layer.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-3, 5-7, 9-13 & 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller (4,544,517), in view of Marutsuka (2002/0071934 A1) and Motoki et al, as previously discussed in sections 5 & 6 of the action mailed 4/12/2005.

To reiterate, in Miller, see the abstract; flowchart; Fig. 2; col. 1, lines 45- col. 2, lines 32 & 53-65; col. 3, lines 1-25 & 50-56 for making electromagnetic interferences (EMI) shielding by glow discharge treating a substrate surface (polymeric, glass or ceramic) to activate, where the gas used is air (hence contains oxygen and is considered to read an oxygen plasma cleaning) as well as the generic cleaning of claim 10, then vacuum vapor plating at pressures below 5×10^{-5} torr, first an adhesion layer (Cr or stainless steel), second a shielding layer (Cu or Al), then finally a protective layer (Cr or stainless steel), Miller differs from applicant's claims by teaching generic vapor plating with no details on the vaporization technique, while the claims require ion plating, a specific vacuum vapor deposition process.

Marutsuka, who is also making a form of EMI shielding on substrates that may be plastic, teaches a metallic layer deposited by a dry plating technique, such as vapor deposition, sputtering or ion plating, that may be a single layer or a composite layer of 2 or more, with Cu, Ni, Fe, Cr, Ti, Al, Au, Ag, etc. listed, with Cu preferred for shielding, but also recommended to have copper held between metals with

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"high corrosion-proofness", with Cr or Ni mentioned as preferred for this function ([0020]; [0035-36]; [0040-41]).

It would have been obvious to one of ordinary skill from the above teachings of Miller and Marutsuka ('934), that for EMI vapor deposited metal layers, ion plating is an equivalent technique, with the further teachings of Motoki et al (prior discussion repeated below) providing further motivation of expected improved adhesion due to ion bombardment that will be present therewith.

Miller differs from amended claims 1 & 10 by suggesting Cr or stainless steel as the adhesion layer, not teaching Ni or phosphorus nickel as a possible first/adhesion layer, however Marutsuka reveals that due to protective effects from corrosion, that Ni equivalently with Cr can be a desirable layer on either side of the middle copper shielding layer. It would have been obvious to one of ordinary skill in the art, considering Motoki et al's teaching on the ion bombardment effect of plasma environment to improve adhesion of the metal layers to both substrate and especially between Ni and Cu, that the suggestion of Ni as a first layer would have been expected to be equivalent to Miller's taught Cr adhesion layer, due to the shown equivalence use in an analogous three layer structure and expected adhesion.

Motoki et al provides cumulative considerations in teaching deposition of single or multiple metal layers as discussed in the primary or secondary references also for deposit on plasma cleaned and activated plastic substrates, where initial plasma treatment is also taught (although with an inert gas), but the vaporized metal are deposited with high frequency plasma excitation to ionize which is said to cause improved adhesion due to activation by the plasma (as compared to vacuum deposition). See the abstract; col. 1, lines 18-36 & 46-60+; col. 2, lines 9-31, summary; col. 3, lines 50- col. 4, line 15+ & 44-55+; and column 8, lines 4-46, especially 10-22 & 40-43. Due to the taught improved adhesion due to the plasma excitation, i.e. ionization, effect on the surface interfaces compared to generic vacuum deposition techniques, it would have been obvious to one of ordinary skill in the art, that of the listing of various vapor deposition techniques in Marutsuka ('934), that ion plating which similarly involving ionization

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effect on the surface being deposited, would have been expected to be especially preferable due to expected improvement in adhesion expected between layers due to the ionization/ion bombardment, hence obvious to employ Marutsuka ('934)'s suggested ion plating in the combination of Miller & Marutsuka ('934) as superior to generic vapor deposition. Particular note, Motoki et al's discussion on improvement in Cu/Ni-Cr or Cu/Ni interface adhesion (column, lines 53-60 and column 8, lines 40-43).

With respect to the newly added thickness ranges for the three layers of new claims 22-24, the primary reference of Miller in column 2, lines 1-30, especially 18-25, teaches a preference for Cr adhesion layer of about 300-500 Angstroms = 30-50 nm; Cu shielding layer of about 2000-10,000 Angstroms = 200-1000 nm; and a protective layer of about 2000-5000 Angstroms = 200-500 nm, hence both the shielding and protective layers as taught by Miller are of overlapping ranges with those now claimed by applicant. The claimed thickness range of the adhesive layer, which is effectively 5-10 nm is on the same order of magnitude as that of Miller et al. (30-50 nm), and it would have been obvious to one of ordinary skill in the art given the above combination to use routine experimentation to determine the optimum thickness for the Ni adhesion layer as suggested by the above combination when ion plating is employed, where with the improvement expected from the use of ion techniques on the adhesion, it would have been expected that layers thinner than Miller's 30-50 nm would have been expected to be effective for providing the desired adhesion.

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miller, in view of Marutsuka (2002/0071934 A1) and Motoki et al as applied to claims 1-3, 5-7, 9-13 & 22-24 above, and further in view of Gabower (6,570,085 B1).

The combination as discussed above in section 5, while providing for initial plasma activation/cleaning at an air pressure (i.e. includes oxygen) of about $<5 \times 10^{-5}$ Torr from Miller's teachings does not specifically it and put a flow of oxygen as in claim 4, however Gabower, who is also making EMI shielding on plastic substrates teaching overlapping useful vacuum metallization techniques

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inclusive of thermal evaporation, sputtering, ion plating, electron beam [evaporation], etc. (abstract; col. 3, lines 60-63), also teaches pretreatment with ionized gas, where the gas used may be oxygen, before the metallization step, such as Al, Cu or Ag deposition (col. 5, lines 10-35 and col. 6, lines 12-27). Particular oxygen flow rates would have been determined via routine experimentation, depending on particular chamber configuration, exhaust rate, etc.

It would have been obvious to one of ordinary skill in the art to employ analogous O-plasma pretreatments of Gabower in Miller, as they serve the same purpose, and that it would have been obvious that any of the known vapor deposition techniques including ion plating as suggested as equivalent by Gabower (col. 8, lines 30-49) would have been effective therewith in Miller given the teachings of equivalent use in general for shielding depositions, as well as the functional similarity of low pressure air and oxygen cleaning plasmas, such that they are complementary techniques where it these specific supply of oxygen would have been expected to advantageously provide better control or exclusion of possible contaminants.

As was previously noted, Gabower does not teach a preference for any particular metallization technique per se, but he does teach the need to control parameters, such as temperature, etc., to limit stress and damage such as warpage to the substrate (col. 7-8+), and note on col. 13, line 1-9, that Cu deposited on to substrate has a problem with uniform adhesion, but is usually otherwise the superior shielding metal when compared with Al or Ag. It was previously noted that the Miller dealt with the adhesion issue, and if of secondary references are as applied relevant to nickel as the adhesion layer, but Gabower further underscores the known need for an adhesion layer when using a vapor deposited Cu layer.

7. Applicant's arguments filed 9/2/2005 and partially discussed above have been fully considered but they are not persuasive.

Applicants' discussion of the applied art treats each reference as a stand-alone reference, i.e. as it each reference must contain all elements of the independent claim, but do not discuss the combination as

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applied. Applicant's discussion of Marutsuka appears to assert that no relevant metals are taught therein by citing [0036] for compositions of the metallic layer, but ignoring the cited and applied teachings of [0040] which explicitly suggest Cu between corrosion resistant metals, such as chromium, nickel, etc., for use as the metallic shielding layer, where [0041] also suggests the dry plating technique of ion plating for use in the deposition of this multilayer metallic layer, hence applicant's arguments are utterly unconvincing.

With respect to Motoki et al, applicants should note that washing is a wet or generally aqueous process and that Motoki et al.'s plasma treatment in the section they cited and in column 4 provides a clean substrate, to which applicants essentially admit Ni (or Cu) may be applied (see top of page 11 of the 9/2/2005 remarks) and sections cited by both applicants and this examiner in Motoki include multilayer shielding film deposits. The primer coating layers referred to by Motoki et al. are solution coatings, hence not a teaching against a contrary to a vapor deposited/ion plated adhesion layer. Hence, while Motoki et al. do not explicitly use nickel as an adhesion layer per se, they are supportive of each use in the combination as applied above, which applicants have not discussed.

8. Copending case 10/813,409 remains noted to be directed to the vacuum vapor deposition of sputtering for EMI coatings of potentially like materials, but currently the present case differs by requiring the multiple layers and ion plating (which can overlap with sputtering but does not necessarily), while the other application has sputter process details that differs.

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH**

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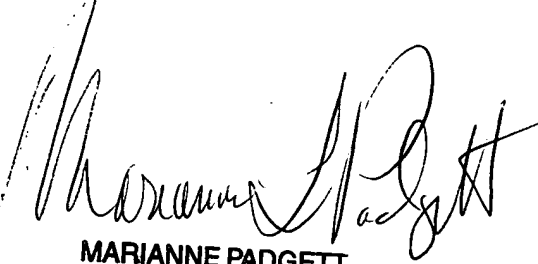
shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marianne L. Padgett whose telephone number is (571) 272-1425. The examiner can normally be reached on M-F from about 8:30 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained of from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MLP 11/23/2005



MARIANNE PADGETT
PRIMARY EXAMINER